

Docket No.: 52352-483 (E0610)

\$APF/11725
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In Application of

Raj N. MASTER et al.

Application No.: 09/922,936

Filed: August 7, 2001

For: CONTROLLED AND PROGRAMMED DEPOSITION OF FLUX ON A FLIP-CHIP BY
SPRAYING

: Customer Number: 20277

: Confirmation Number: 9521

: Group Art Unit: 1725

: Examiner: Z. Pittman

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TC 1700

TRANSMITTAL OF APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith in triplicate is Appellants' Appeal Brief in support of the Notice of Appeal filed July 22, 2003. Please charge the Appeal Brief fee of \$320.00 to Deposit Account 500417.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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APPEAL BRIEF

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed July 22, 2003.

I. REAL PARTY IN INTEREST

The real party in interest is Advanced Micro Devices, Inc.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals and interferences.

III. STATUS OF CLAIMS

Claims 1-18 and 22-30 are pending in this application. Claims 1-17 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. § 1.142(b). Claims 25 and 26 have

been allowed, and claims 18, 22-24 and 27-30 have been finally rejected. It is from the final rejection of claims 18, 22-24 and 27-30 that this Appeal is taken.

IV. STATUS OF AMENDMENTS

No amendment to the claims has been filed subsequent to the Final Office Action dated May 19, 2003.

V. SUMMARY OF INVENTION

The present invention addresses and solves the problems resulting from removal of residual flux residue from a semiconductor chip (page 2 of Appellants' disclosure, lines 24-33). Flux residue remaining on the surface of semiconductor chip can lead to function failure during long term use of the semiconductor chip due to stress corrosion (page 2, lines 29-30). Furthermore, if any residual film of flux residue remains on a substrate or device surface material, this film can cause detriment to the adhesion of C4 epoxy encapsulant or underfill (page 2, lines 30-33). Therefore, there was a need for an improved apparatus for dispensing flux on a substrate that reduces excess flux residue.

According to the present invention, the excess flux residue problem is solved by providing an apparatus that includes a controller configured to control valve pressure, flux viscosity, and flux spray pattern based on a configuration of the substrate and an arrangement pattern of conductive terminals thereon to reduce the amount of flux dispensed, as recited in independent claim 18. The controller of the claimed apparatus further controllably dispenses flux between a specified viscosity range at a specified false pressure "to significantly reduce the flux residue after the high temperature solder reflow environment" (page 5, lines 14-17). The

controller can also control the flux spray pattern to optimize the amount of flux dispensed (page 7, lines 4-15). The present invention, thus, constitutes an improvement over conventional flux dispensing apparatus by more enabling greater precision in controlling such parameters as valve pressure, flux viscosity, and flux spray pattern to reduce excess flux residue.

VI. ISSUES

A. The Rejections:

1. Claims 18, 22-24 and 27-30 were rejected under 35 U.S.C. § 102 for lack of novelty based upon Brownfield et al.; and
2. Claims 18, 22-23 and 27-30 were rejected under 35 U.S.C. § 102 for lack of novelty based upon Hogan et al.

B. The Issues Which Arise In This Appeal And Require Resolution By The Honorable Board of Patent Appeals And Interferences (The Board) Are:

1. Whether claims 18, 22-24 and 27-30 are unpatentable under 35 U.S.C. § 102 for lack of novelty based upon Brownfield et al.; and
2. Whether claims 18, 22-23 and 27-30 are unpatentable under 35 U.S.C. § 102 for lack of novelty based upon Hogan et al.

VII. GROUPING OF CLAIMS

The appealed claims do not stand or fall together as a group. Claims 18, 24 and 27-30 stand or fall together as a group with claim 18. Claims 22 and 23 stand or fall together as a group with claim 22.

VIII. THE ARGUMENT

THE REJECTION OF CLAIMS 18, 22-24 AND 27-30 UNDER 35 U.S.C. § 102 FOR LACK OF NOVELTY BASED UPON BROWNFIELD ET AL., U.S. PATENT NO. 6,399,902 (HEREINAFTER BROWNFIELD)

In describing the applied prior art of Brownfield in the Final Office Action dated May 19, 2003, the Examiner asserted that the apparatus of Brownfield comprises two main components: a controller and a scale means for measuring the weight of an IC component to which the flux is to be applied. The Examiner also described the controller as (i) accepting a signal from the scale means; (ii) computing a volume of flux dispensed on the IC component, and (iii) sending a signal to a liquid flow controller that determines how much flux is dispensed.

In contrast, claim 18 recites a data processing device that is configured to control valve pressure, flux viscosity, and flux sprayer pattern based on a configuration of the substrate and an arrangement pattern of conductive terminals on the substrate. The data processing devices also controls the flux viscosity in a range between about 10 centipoises and about 150 centipoises and the valve pressure for spraying the flux in a range between about 1.5 psi and about 30 psi.

Appellants have previously argued that these features recited in claim 18 are not identically disclosed by Brownfield. The Examiner has made two statements in the Final Office Action that are relevant to Appellants' arguments. The first statement is contained within the statement of the rejection on page three of the Office Action, and for ease of reference, this statement is reproduced below:

With respect to the limitations requiring the data processing device adapted for controlling valve pressure in a range between about 1.5 and 30 psi, flux viscosity in a range between about 10 and 150 centipoises, and flux spray pattern based on a configuration of the substrate and an arrangement pattern of conductive terminals and controls movement of the flux dispense nozzle in at least two dimensions relative to the substrate and decides a plurality of subsets based on the configuration of the substrate and the arrangement pattern of conductive terminals thereon, each subset comprising a plurality of conductive terminals closely located to each other, wherein the substrate is a printed circuit board or a flip-chip type electrical component and the plurality of conductive terminals re flip-chip pads or bumps arranged on the printed circuit board or flip-chip type electrical component, it is the examiner's position that these limitations do not further limit the structural aspects of the apparatus. Furthermore, the reference need only teach the structural limitations of the apparatus with those limitations capable of performing the functions indicated. Brownfield et al teaches the structural limitations required by the claims as indicated above. (emphasis added)

The Examiner's position is that the limitations recited in claim 18 described above do not further limit the structural aspects of the claimed apparatus. In the Examiner's second statement, which is found in the Response to Arguments on pages five and six of the Office Action, the Examiner further opines that the structure of Brownfield is capable of performing all of the claimed functions. Appellants respectfully disagree for reasons detailed below.

With regard to the Examiner's assertion that the claimed limitations as to the controller "do not further limit the structural aspects of the apparatus," Appellants respectfully disagree. It is well settled law that a controller/computer can be defined by the manner in which the controller/computer operates. Furthermore, the controller reciting, for example, controlling valve pressure implies that the controller itself (or in combination with an unclaimed feature) includes an element, such as a pressure regulator, that control valve pressure. In addition, this pressure controlling element, if not already incorporated into the claimed controller, is connected to the claimed controller. Other capabilities, such as controlling spray pattern, attributed to the controller in the claims also imply structural elements. Therefore, Appellants disagree with the Examiner's assertion that the claimed limitations regarding the controller do not further structurally limit the apparatus of the claimed invention.

In responding to Appellants' argument that the controller 101 of Brownfield is not disclosed as structurally capable of controlling valve pressure for spraying flux, the Examiner stated on page five of the Office Action the following:

Being that the controller of Brownfield is a computer and discloses controlling the volume amount of flux to be dispensed and discloses controlling the flow of the flux and since controlling the amount of flux is related to how the flux is dispensed, Brownfield is structurally capable of controlling valve pressure for spraying flux

In contrast to that asserted by the Examiner, Brownfield is not structurally capable of controlling valve pressure for spraying flux. Brownfield only teaches sending a signal from the controller to the liquid flow controller 106, causing the liquid flow controller 106 to open and thereby allow flux to move to the spray nozzle 109 (column 3, lines 8-11). After the weight of the flux dispensed reaches a preset limit, the controller 101 of Brownfield send a signal to the liquid flow controller 106 to shut off the flow of flux (column 3, lines 13-16). Brownfield, thus, only teaches controlling volume and does not teach controlling pressure, and the control of volume does not equate to the control of pressure. In fact, Brownfield does not even disclose measuring pressure. Therefore, the Examiner's assertion that Brownfield is structurally capable of controlling valve pressure is without factual support, as Brownfield is completely silent as to controlling and/or measuring of pressure.

As previously discussed, Brownfield only discloses that the controller 101 accepts a signal from a scale and controls the flow of flux based upon weight. However, the claimed controller is configured to control valve pressure, flux viscosity, and flux sprayer pattern based on a configuration of the substrate and an arrangement pattern of conductive terminals on the substrate (claim 18) and this feature is not disclosed by Brownfield. Appellants have further

argued that the claimed data processing device (i) controls movement of the flux dispense nozzle in at least two dimensions relative to the substrate and decides a plurality of subsets based on the configuration of the substrate and the arrangement pattern of conductive terminals thereon with each subset comprising a plurality of conductive terminals closely located to each other (claim 22) and (ii) controls the apparatus to selectively spray the flux on each subset sequentially (claim 23), and these claimed features are not disclosed by Brownfield.

In responding to these arguments by Appellants, the Examiner stated on pages five and six of the Office Action the following:

The claims are directed toward an apparatus for dispensing flux on a substrate including a data processing device. Brownfield discloses an apparatus for dispensing flux on a substrate including a controller that is a computer ... The controller of Brownfield provides a variety of functions relating to the dispersion of the flux (see col. 3, l. 4-38). The limitations as claimed by applicant does not further structurally limit the apparatus nor distinguish it from the apparatus as disclosed by Brownfield as the apparatus of Brownfield is capable of performing the functions on the substrates as claimed.

The Examiner appears to be under the impression that a controller capable of performing a single set of functions (i.e., controlling the flow of flux based on weight) is capable of performing any function, including those functions recited in claims 18, 22 and 23. However, similar to the Examiner's previous arguments, this assertion by the Examiner lacks a factual basis.

Since Brownfield does not teach measuring or determining such characteristics as pressure, configuration of a substrate, and an arrangement pattern of conductive terminals on the substrate, as recited in claim 18, the controller 101 of Brownfield cannot be deemed configured to control these characteristics. Furthermore, since Brownfield does not teach that the flux dispenser moves in at least two directions relative to the substrate, the controller 101 of Brownfield cannot be deemed configured to control movements of the dispenser relative to the

substrate in at least two dimensions, as recited in claim 22. Since Brownfield does not teach that the controller 60 determines a plurality of subsets of conductive terminals, the controller 60 also cannot selectively spray the flux on each subset sequentially, as recited in claim 23. Therefore, each of claims 18, 22 and 23 distinguish the claimed invention from Brownfield.

THE REJECTION OF CLAIMS 18, 22-23 AND 27-30 UNDER 35 U.S.C. § 102 FOR LACK OF NOVELTY BASED UPON HOGAN ET AL., U.S. PATENT NO. 6,265,017 (HEREINAFTER HOGAN)

In describing the applied prior art of Hogan in the Final Office Action dated May 19, 2003, the Examiner asserted that the apparatus of Hogan includes a spray gun, which has a nozzle disposed within a coating chamber that emits a liquid spray pattern, and a controller, which is connected to the spray gun and intermittently pulses the spray gun on and off to coat overlapping sections of a circuit board in response to the circuit board moving a predetermined distance.

Similar to the rejection based on Brownfield, the Examiner referred to the limitations regarding the controller and asserted that "the examiner's position that these limitations do not further limit the structural aspects of the apparatus." In response, Appellants incorporate herein the arguments previously presented regarding the same issue. Specifically, Appellants argue that the limitations regarding the capability of controller structurally limit the claimed apparatus, and therefore, the Examiner must give patentable weight to these limitations.

Also similar to the rejection based on Brownfield, Appellants have previously argued that Hogan fails to identically disclose the claimed configuration of the controller, and the Examiner

has responded by asserting that "[t]he limitations as claimed by applicant does not further structurally limit the apparatus nor distinguish it from the apparatus as disclosed by Hogan as the apparatus of Hogan is capable of performing the functions on the substrates as claimed." In response, Appellants respectfully submit that the Examiner's assertion is without factual basis.

The controller 60 of Hogan controls the output of the spray gun 20 such that the circuit board 12 is coated with the same volume of solder flux per unit length regardless of the speed of the movement of the circuit board 12 relative to the spray gun 20 (column 6, lines 2-7). This is accomplished by having the controller 60 trigger the spray gun 20 for a specific period of time based upon the amount of movement of the circuit board 12 relative to the spray gun 20 (column 5, lines 58-67). Hogan, however, does not measure such characteristics as pressure, configuration of a substrate, and an arrangement pattern of conductive terminals on the substrate, as recited in claim 18, and since Hogan does not measure these characteristics, the controller 60 of Hogan cannot be deemed configured to control these characteristics. Furthermore, since Hogan does not teach that the flux dispenser moves in at least two directions relative to the substrate, the controller 60 of Hogan cannot be deemed configured to control movements of the dispenser relative to the substrate in at least two dimensions, as recited in claim 22. Therefore, each of claims 18 and 22 distinguish the claimed invention from Hogan.

IX. CONCLUSION

It should, therefore, be apparent that the Examiner has failed to identically disclose each of the limitations recited in claims 18, 22 and 23. Specifically, the Examiner has failed to disclose that the controller 101 of Brownfield or the controller 60 of Hogan is configured in the manner recited

in the claims. Appellants, therefore, respectfully submit that the imposed separate rejections of claims 18, 22-24 and 27-30 under 35 U.S.C. § 102 for lack of novelty based upon Brownfield and Hogan are not factually or legally viable.

X. PRAYER FOR RELIEF

Based upon the foregoing, Appellants respectfully submit that one having ordinary skill in the art would not have found the claimed invention identically disclosed within the meaning of 35 U.S.C. § 102. Appellants, therefore, respectfully solicit the Honorable Board to reverse the Examiner's rejections under 35 U.S.C § 102.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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APPENDIX

Claims 1-17 (Withdrawn)

18. An apparatus for dispensing flux on a substrate having a plurality of conductive terminals thereon, the apparatus comprising:

a data processing device configured to control valve pressure, flux viscosity, and flux spray pattern based on a configuration of the substrate and an arrangement pattern of conductive terminals thereon; and

a flux dispense nozzle configured for spraying flux on the conductive terminals, wherein the data processing device controls the flux viscosity in a range between about 10 centipoises and about 150 centipoises and controls the valve pressure for spraying the flux in a range between about 1.5 psi and about 30 psi.

Claims 19-21 (Cancelled)

22. The apparatus of claim 18, wherein the data processing device controls movement of the flux dispense nozzle in at least two dimensions relative to the substrate and decides a plurality of subsets based on the configuration of the substrate and the arrangement pattern of conductive terminals thereon, each subset comprising a plurality of conductive terminals closely located to each other.

23. The apparatus of claim 22, the data processing device controls the apparatus to selectively spray the flux on each subset sequentially.

24. The apparatus of claim 18, wherein the flux nozzle is a flux needle.

Claims 25-26 (Allowed)

27. The apparatus of claim 18, wherein the flux contained in the flux fluid chamber is maintained at a fluid pressure range between about 0.5 psi and about 30 psi.

28. The apparatus of claim 27, wherein a main pressure range of the apparatus for dispensing flux is maintained at a pressure range between about 60 psi and about 100 psi to maintain the valve pressure range and the flux pressure range.

29. The apparatus of claim 18, wherein the substrate is a printed circuit board and the plurality of conductive terminals are flip-chip pads arranged on the printed circuit board.

30. The apparatus of claim 18, wherein the substrate is a flip-chip type electrical component and the plurality of conductive terminals are flip-chip bumps arranged on the flip-chip type electrical component.